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REMARKS

Applicant respectfully request favorable reconsideration and reexamination of this application.

Claim 14 is amended. Claim 14 now resembles the version as amended with the Supplemental Preliminary Amendment filed on December 8, 2005.

Claim 30 is new and supported at least by, for example, page 4, lines 2-22 of the Specification.

Claims 18-24 were allowed.

Claims 1-30 are pending in this application.

Claim Objection

Claim 14 was objected to because of an informality. The term "radical" has been deleted and replaced with "radial."

35 USC 112 Rejection

Claim 14 was rejected under 35 USC 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicants regard as the invention. Claim 14 has been amended to resemble the version as filed with the Supplemental Preliminary Amendment filed on December 8, 2005. The difference between the version filed with the Supplemental Preliminary Amendment filed on December 8, 2005 and as currently amended is the deletion of the term "substantial," which is maintained from the last Amendment. No new matter is added.

35 USC 103 Rejections

Claims 1-7, 9, 15-17, and 25-29 were rejected under 35 USC 103(a) as being unpatentable over Katayama (US 6,804,180). Applicants respectfully traverse this rejection.

Regarding claim 1, the rejection states that Katayama discloses a light beam separator that is located between the semiconductor laser and the objective lens in Katayama Figure 12, Element 59. Applicants respectfully disagree.

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Katayama discloses that Element 59 of Figure 12 is a "polarizing holographic optical element" (column 16, lines 64-65). Katayama states that Element 59 is similar to the plan view of the holographic optical element 7 shown in Figure 2 (see column 17, lines 10-12). Katayama teaches that the grating of the holographic optical element has a cross section that is a saw-tooth appearance in all of the regions 10 to 17 (see column 7 lines 35-36). Further, because of this shape, almost 100% of the light that is reflected from the disk D and incident onto the holographic optical element is diffracted by the holographic optical element as the + first order diffracted beam.

In contrast, claim 1 requires that a \pm first order diffracted light is produced, not just a + first order. Claim 1 also requires that the \pm first order diffracted light is produced by the information track of the information recording medium, not by the holographic optical element. The rejection did concede that Katayama does not disclose that the light beam separator receives \pm first order diffracted light produced by the information track of the information recording medium.

However, the rejection erroneously combined the diffraction grating (Element 107) shown in Figure 17 with Katayama's holographic optical element. The diffraction grating of Figure 17 converts the light beam emitted from a semiconductor laser 105 into a zero order diffracted beam, a plus first order diffracted beam, and a minus first order diffracted beam, prior to being incident on to the disk D (see column 1, lines 43-63). Even if this diffraction grating theoretically could be combined with the other components of Katayama's device, which Applicants are not conceding, because almost 100% of the light incident onto the holographic optical element is diffracted as + first order diffracted beam, there is no suggestion or motivation to do so. Further, Katayama does not teach or suggest how - first order diffracted beam could be used. Further, even adding the diffraction grating to the Katayama device fails to satisfy other deficiencies of Katayama.

Further, Katayama is silent regarding detecting the tilt angle in the radial direction. Katayama does not teach or suggest that the holographic optical element is capable of changing the amount of light in a relative angle between the disk D and the objective lens by a tilt angle in a radial direction of the disk D. In contrast, claim 1 requires that change in the amount of light is caused by both an angle between the

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information recording medium and the objective lens in a radial direction and by a shift of the objective lens in a radial direction.

For at least the above reasons, Katayama fails to teach or suggest all of the required elements of claim 1. Therefore, claim 1 is patentable over Katayama. Claims 2-9 are also patentable over Katayama for at least the same reasons as claim 1 from which they depend. Applicants respectfully request reexamination and reconsideration of claims 1-9.

Regarding claim 15, the rejection states that Katayama discloses an optical head comprising an arithmetic unit that calculates the electrical signal converted by the light-receiving element and detects the relative angle between the information recording medium and the objective lens. Applicants respectfully disagree.

Katayama does not teach or suggest an arithmetic unit as a part of an optical head. The rejection states that Figure 17 illustrates an optical head but fails to illustrate an arithmetic unit. Further, Katayama states that there may be two approaches to detect a tangential tilt of an optical recording medium using signal outputs from the optical head illustrated in Figure 17 (see column 2, lines 36-53). However, Katayama teaches that both methods are undesirable. Katayama teaches that the first method has a defect of not being capable of detecting tangential tilt at a high sensitivity while for the second method "no tangential tilt can be detected with recordable and rewritable optical recording media where no such signal is recorded previously" (column 2, line 60 to column 3, line 7). Accordingly, rather than teaching or suggesting, Katayama teaches away from using the two approaches that may allow the detection of a tangential tilt of an optical recording medium. Thus, Katayama fails to teach or suggest an optical head comprising an arithmetic unit that calculates the electrical signal converted by the light-receiving element, and detects a relative angle in a radial direction of the information recording medium between the information recording medium and the objective lens, as required. Therefore, claim 15 is patentable over Katayama. Claims 16-17 are also patentable for at least the same reasons as claim 15 from which they depend. Applicants respectfully request reexamination and reconsideration of claims 15-17.

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Regarding claim 25, the rejection states that Katayama discloses an arithmetic unit that detects a relative position of the information recording medium with respect to a predetermined reference position in the focusing direction, and calculates at least one selected from the relative angle between the information recording medium and the objective lens, the amount of tilt, the amount of warping, and the cross-sectional shape of the information recording medium by using a driving signal applied to the objective lens drive by the voltage controller and a focusing error signal produced by the light-receiving element. Applicants respectfully disagree.

The signal pathway illustrated in Katayama's Figure 12 by directional arrows, indicates that a signal is sent from the Module 56 to a Signal Processing Circuit 42B, then a signal is sent from the Signal Processing Circuit 42B to a driving circuit 43. Katayama's Figure 12 does not illustrate a directional arrow from the driving circuit 43 back to the Signal Processing Circuit 42B. Further, Katayama teaches that "calculation result is supplied to the driving circuit" but never suggests that any information from the driving circuit is used by the Signal Processing Circuit to detect a relative position of the information recording medium. In contrast, claim 25 requires using a driving signal applied to the objective lens drive by the voltage controller and a focusing error signal produced by the light-receiving element. Thus, Katayama fails to teach or suggest at least this element of claim 25. Therefore, claim 25 is patentable over Katayama. Claims 26-29 are also patentable for at least the same reasons as claim 25 from which they depend. Applicants respectfully request reexamination and reconsideration of claims 25-29.

Claim 30 should be patentable over Katayama because Katayama fails to teach or suggest an arithmetic unit that calculates the electrical signal converted by the light-receiving element, and detects a relative angle in a radial direction of the information recording medium between the information recording medium and the objective lens, as required. Applicants respectfully request favorable consideration of claim 30.

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Claim 8 was rejected under 35 USC 103(a) as being unpatentable over Katayama as applied to claims 1-7, 9, 15-17, and 25-29, and further in view of Komma et al (US 5737296). Applicants respectfully traverse this rejection.

Claim 8 is patentable for at least the same reason as claim 1 from which it depends. Further, Komma et al. fails to remedy the deficiencies of Katayama. Applicants respectfully request reexamination and reconsideration of claim 8.

Claims 10-11 and 13-14 were rejected under 35 USC 103(a) as being unpatentable over Katayama and in view of Matsui et al. (US 5231621). Applicants respectfully traverse this rejection.

Regarding claim 10, the rejection concedes that Katayama does not disclose a light beam reflection portion that reflects the light beam from the semiconductor laser and moves together with the objective lens. The rejection states that Matsui et al. discloses the use of a reflective element. However, the rejection fails to state how the supposed reflective element disclosed in Matsui et al. can be combined with Katayama to satisfy the elements as required in claim 10.

Figure 2 of Matsui et al. illustrates a reflective element 8 provided in the optical member 7. Even in alternative embodiments, the reflection area 8₁ is still provided in the optical member 7, wherein the reflection area 8₁ "must be located between a front focus point and a rear focus point of the detection light beam when the defocusing is along the optical axis" (column 5, lines 10-18; see also Figure 11). Matsui et al. further teaches that the reflective element 8 "totally reflects the detection beam flux and directs it to the sensor 9" (column 3, lines 34-37). Sensor 9 is also positioned on optical member 7. Optical member 7 is independent of and separated from objective lens 4. Accordingly, Matsui et al. fails to teach or suggest a light beam reflection portion that reflects the light beam from the semiconductor laser and moves together with the objective lens. Thus, Matsui et al. fails to remedy the deficiencies of Katayama. Therefore, claim 10 is patentable over Katayama and in view of Matsui et al. Claims 11-14 are also patentable for at least the same reasons as claim 10 from which they depend. Applicants respectfully request reexamination and reconsideration of claims 10-14.

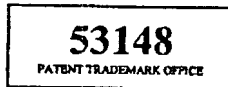
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Allowable Subject Matter

Claims 18-24 were allowed. Claim 12 was considered allowable.

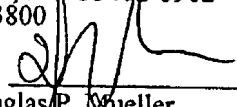
In view of the above amendments and remarks, Applicants respectfully request a Notice of Allowance. If the Examiner believes a telephone conference would advance the prosecution of this application, the Examiner is invited to telephone the undersigned attorney-of record, Douglas P. Mueller (Reg. No. 30,300), at (612) 455-3800.



Dated: July 6, 2007

Respectfully submitted,

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